NCARC
Northern Colorado Amateur Radio Club

NANO VNA'S FOR BEGINNERS

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Backcountry
Ham

Basic Functions of the Nano VNA for Amateur Radio Operators

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- Standing Wave Ratio (SWR)

- Return Loss in dB's

- Line Loss in Coax

- Length of Coax

- Resonate Frequency

- Frequency Range of Antenna

- Antenna and Coax Impedance

By: Jim-KA6ETE
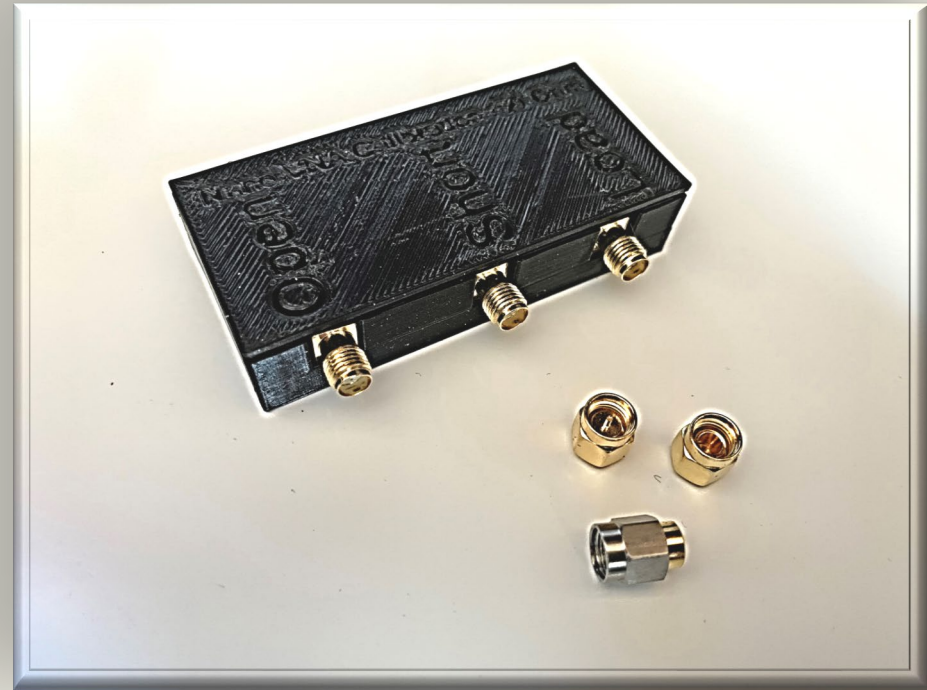
Calibrating the Nano VNA for Antenna and Coax Testing

Calibration is quick and easy to preform and should be done for each use and each band being tested.

Top:

Homemade Calibration Standards:
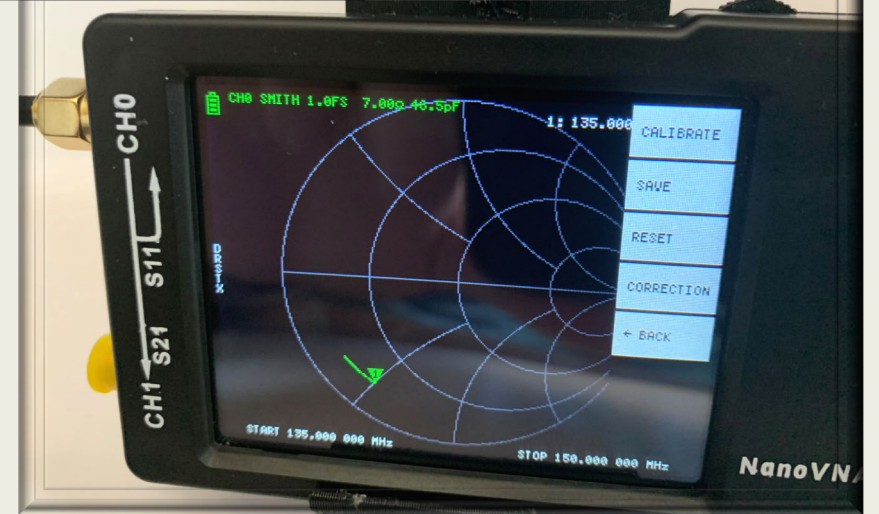The 50ohm Load is a true 50.08 ohms

Bottom:

Supplied Calibration Standards:
Due to quality of manufacturer they can vary in readings. Varying from 44.6 ohms to 57.3 ohms from the ones I tested.

Calibration Step 1:

Power on the Nano VNA and tap the upper right corner of the screen

Next tap on the CAL button, followed by the CALIBRATE button

Calibration Step 2:

Using the extension cable you will be using for DUT (Device under Testing) connect it to the "CH 0" of the Nano VNA and the Open Standard.
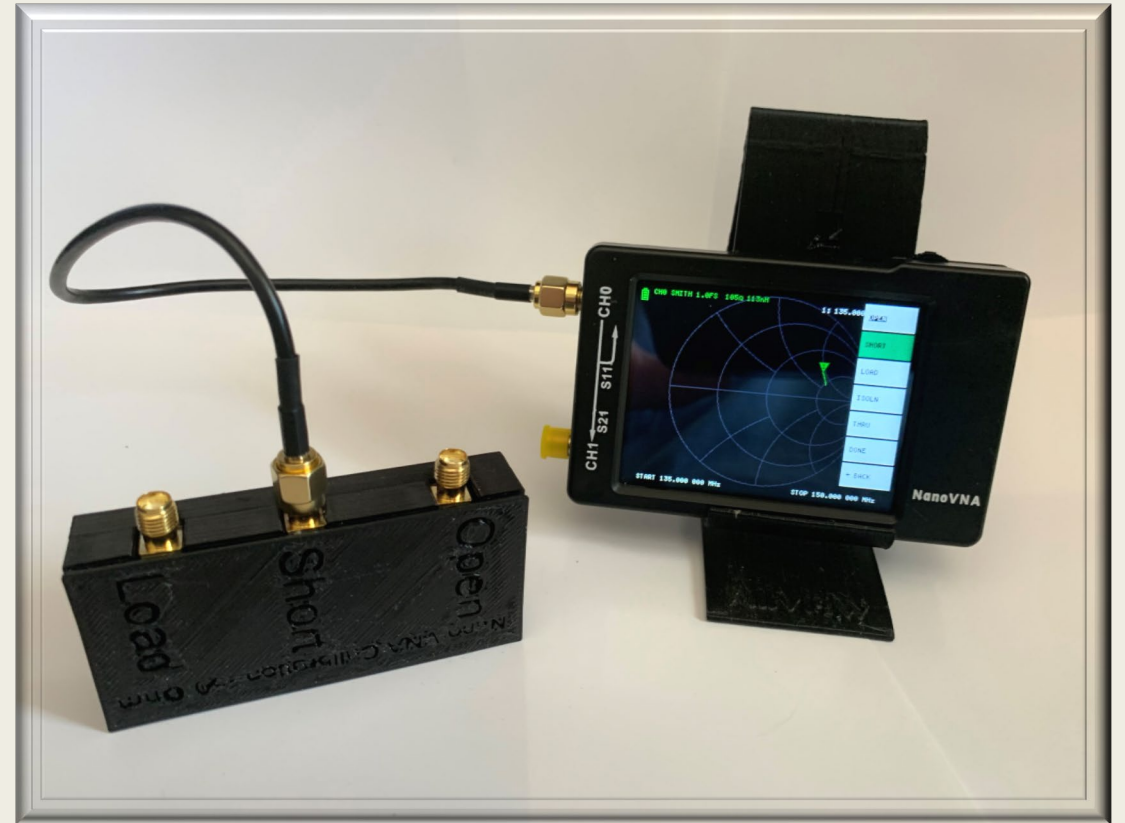
Tap the "OPEN" button

The optimal calibration would be to use all connectors needed to connect to the DUT for calibration but using as many pieces as possible will lower the chance of a false reading.
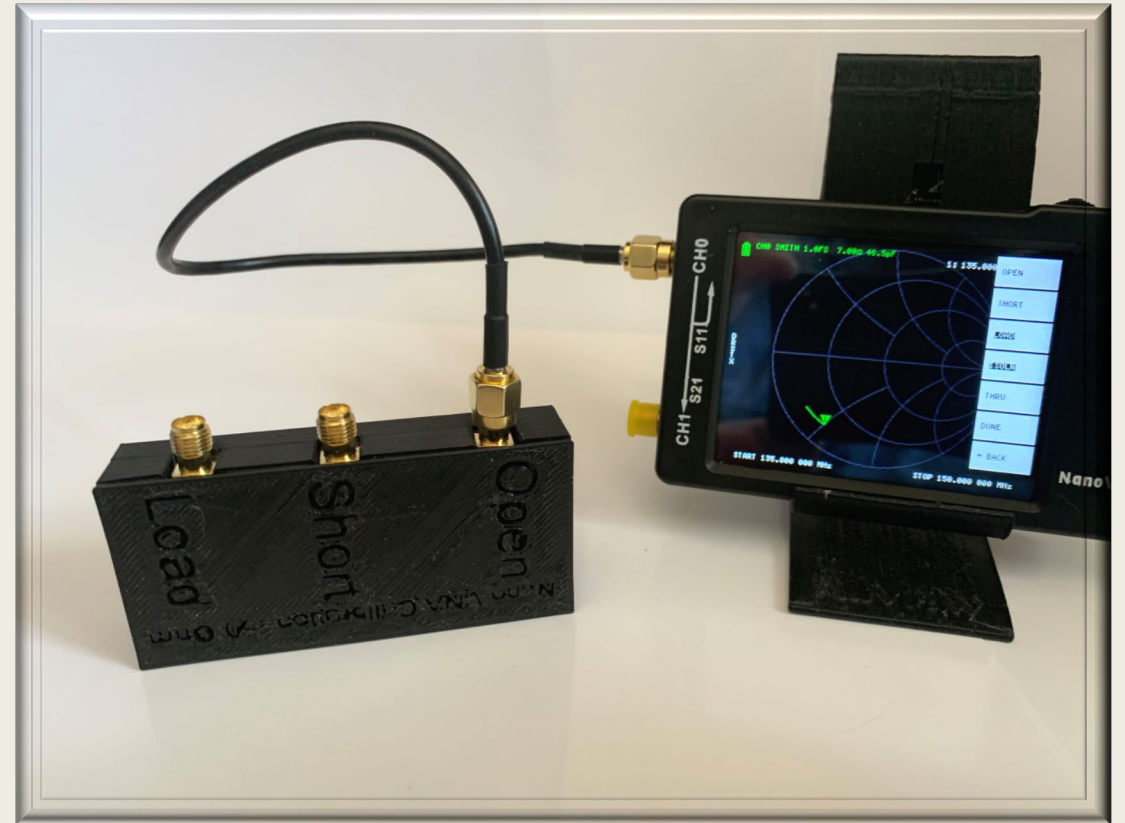
Calibration Step 3:

The next step is to attach the jumper cable to the "SHORT" Standard and press the "SHORT" button on the Nano VNA.

Calibration Step 4:

In step 4 of the Calibration sequence connect the jumper cable to the "LOAD" Standard and press the "LOAD" button on the Nano VNA.

At this point your Nano VNA is ready to test antennas and Coax and you can now press the "Done" button on the Nano VNA.
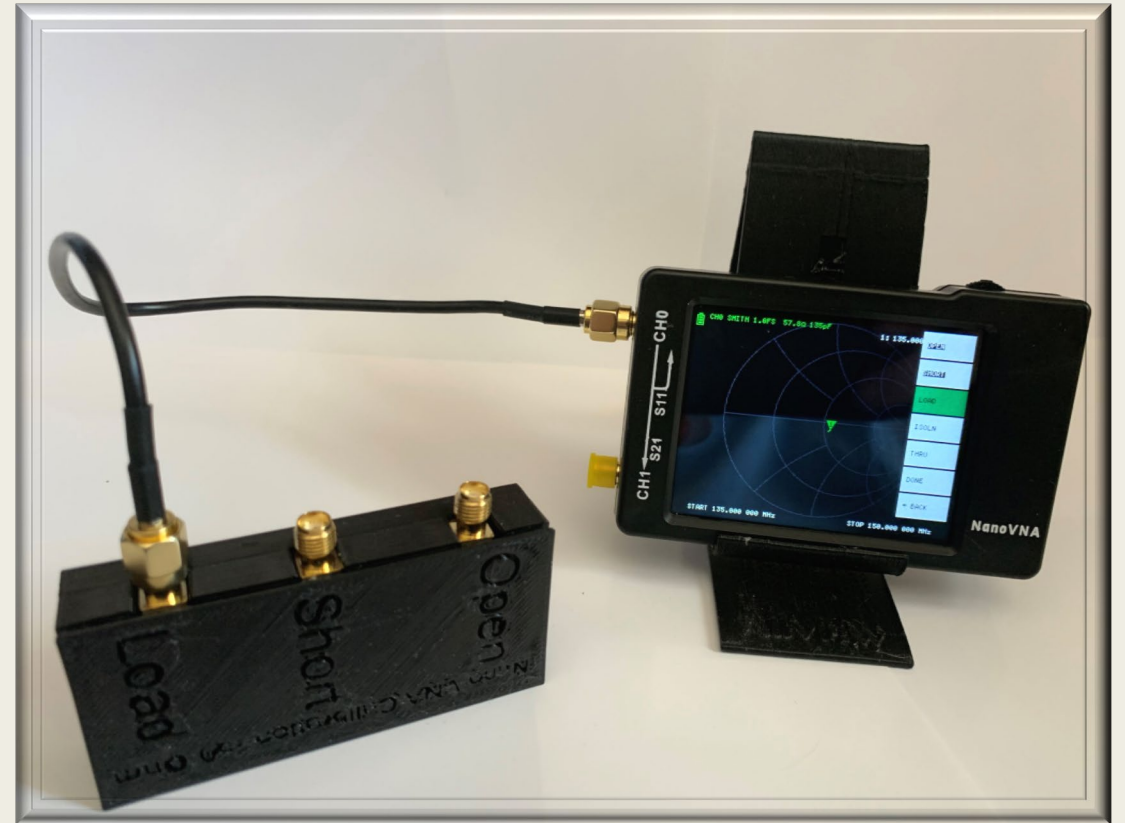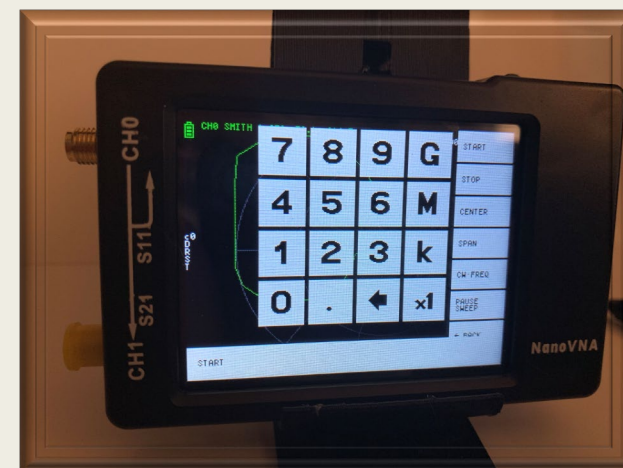
Testing SWR on an Antenna

When doing this you can first disable all but one of the "Traces" is desired.

- **Step 1:** Power on the Nano VNA and calibrate if it is not already completed.

- **Step 2:** Set the Start and Stop frequencies for the Band or section of band you want to test.

- **Step3:** Connect the antenna to be tested.
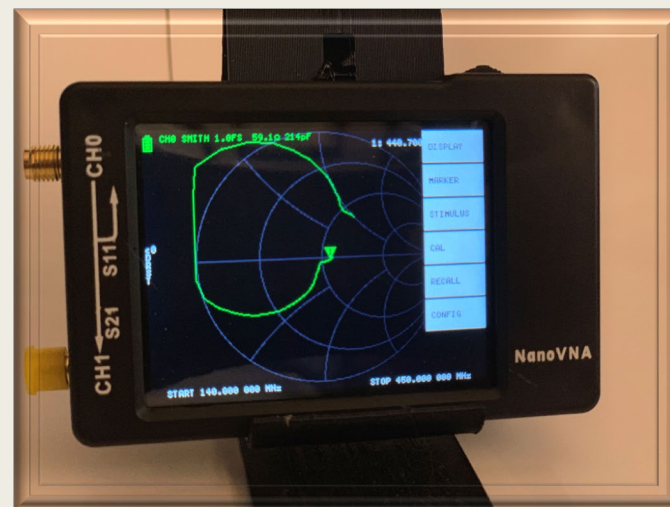
Press "Stimulus" to set the Start Stop Frequencies.

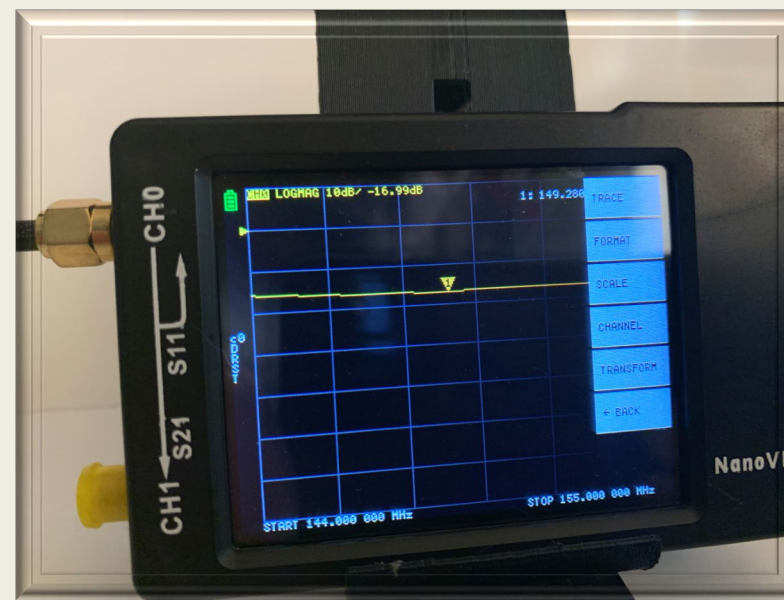Enter the frequency accordingly, in either kHz, MHz or GHz.

Testing SWR on an Antenna

Once the antenna is connected make sure the connection is tightened properly and secure.

- Step 4: Select the Trace you want to use under the "Trace"

- Step 5: Select the Format you want to test such as SWR under the "Format" label.

Now that your results are displayed you can press and drag the marker icon to change the frequency within the range you selected. The frequency in which the marker is on will be displayed in the upper right corner of the display.

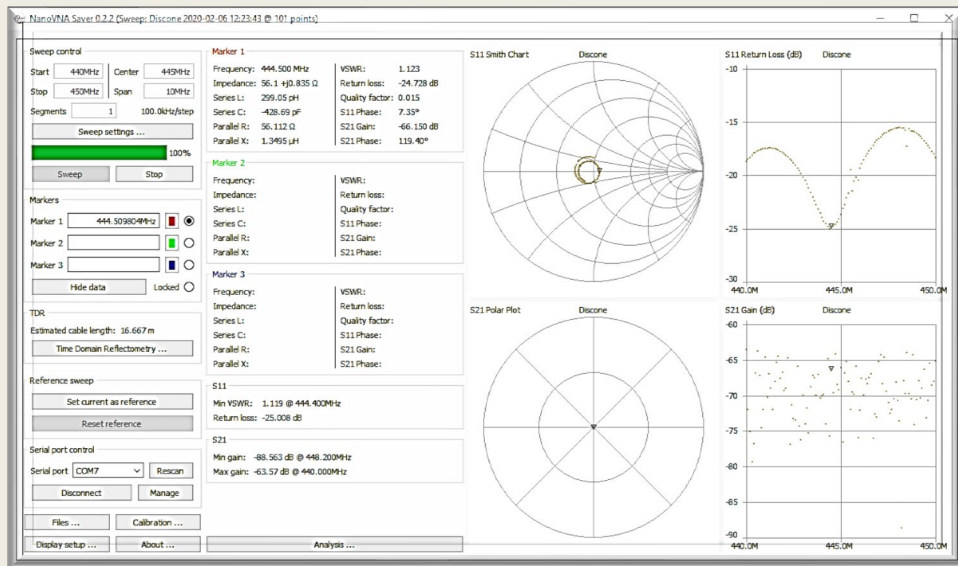# Connecting to a PC or Tablet
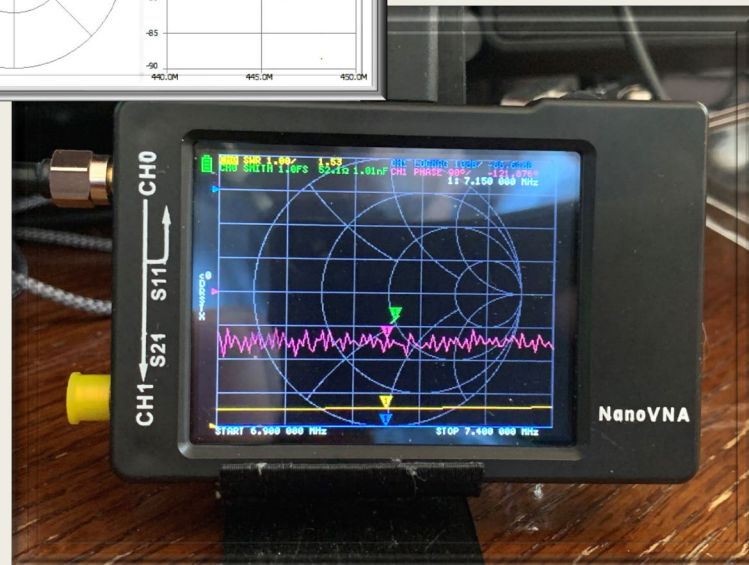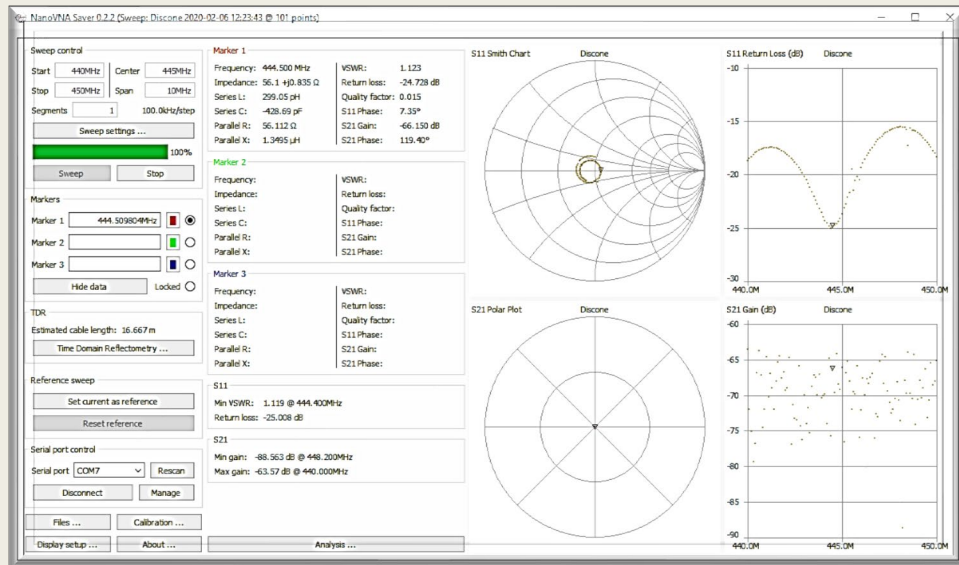
While the Nano VNA can be used as a standalone device, connecting to a tablet or PC via additional software can be easier to utilize all the features the Nano VNA has to offer.

NanoVNA-Saver vs. NanoVNA-Smart

While both programs an improvement in display capabilities over the screen on the Nano VNA, it is personal choice on which to use.
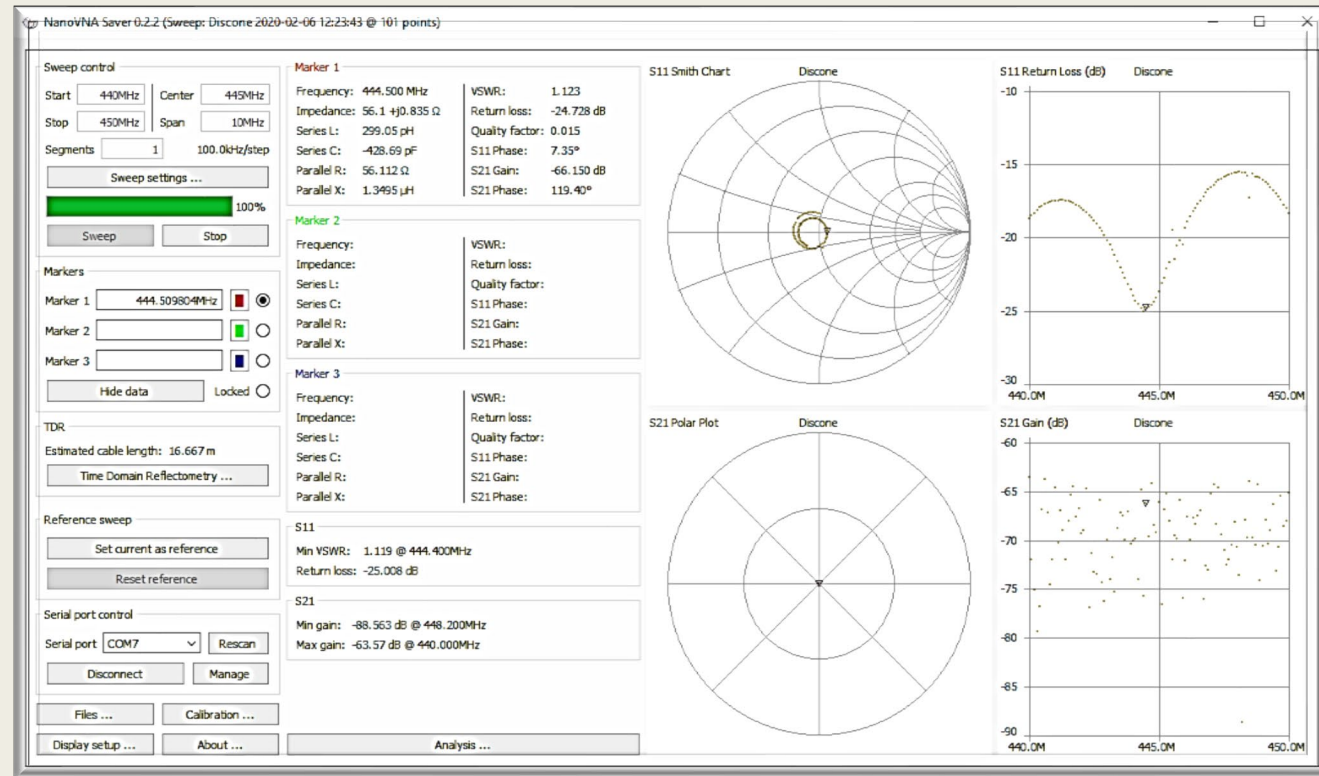

NanoVNA-Saver
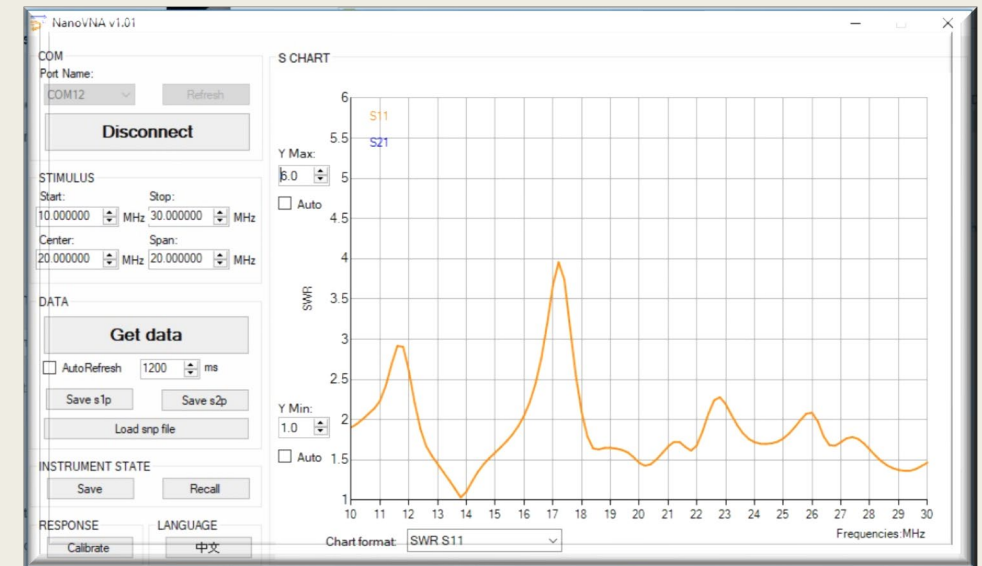
NanoVNA-Smart

NanoVNA-Saver

NanoVNA-Saver is an opensource Python 3.7/QT program available for download on GitHub at:

https://github.com/mihtjel/nanovna-saver/releases

This is also the software package I use with both my desktop PC and windows 10 tablet.

Additional Resource Links:

- https://nt7s.com/2019/09/some-pc-software-for-nanovna/
- https://oristopo.github.io/nVhelp/html/software.htm
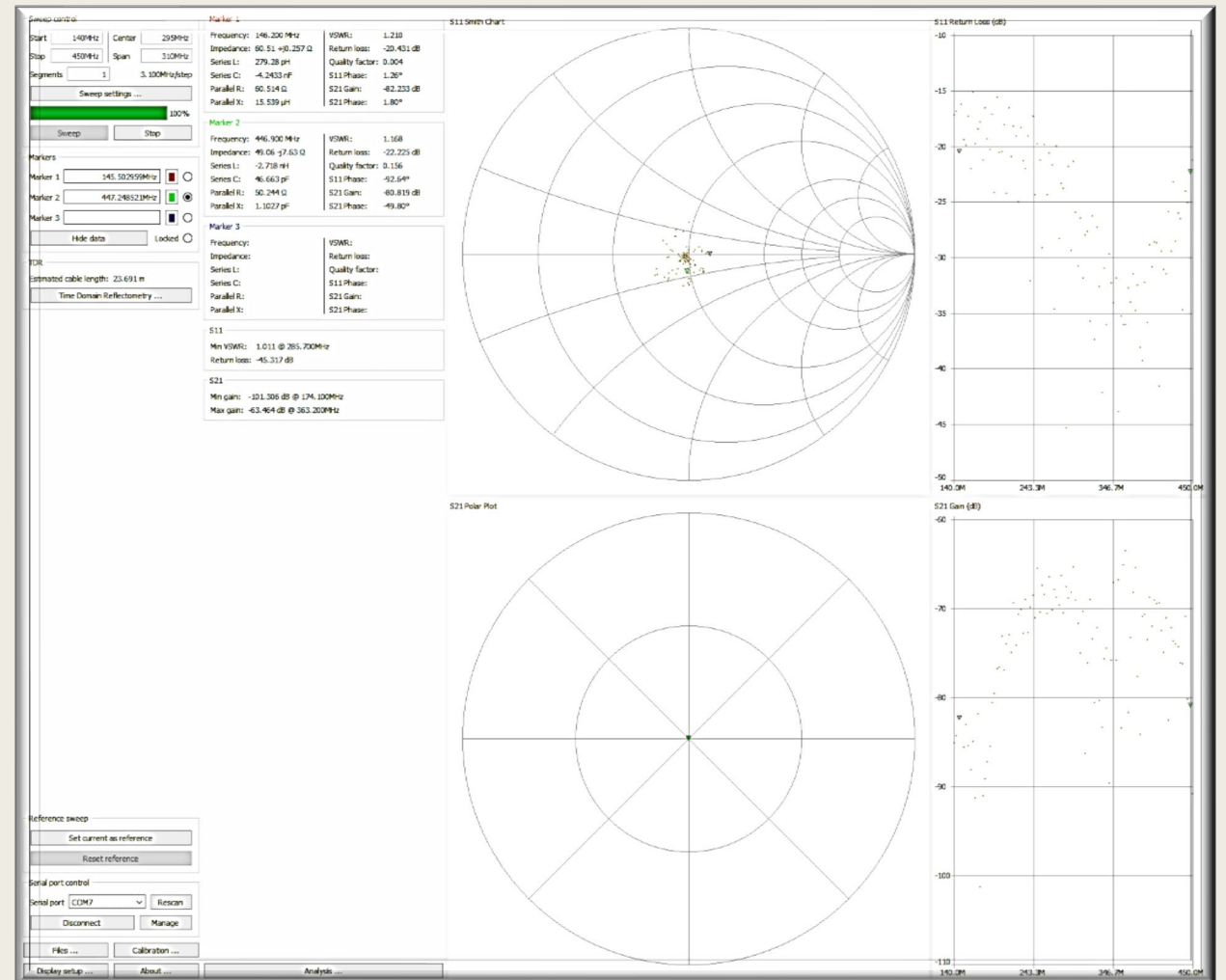- https://www.rtl-sdr.com/reviews-of-the-nanovna-an-ultra-low-cost-50-vector-network-analyzer/comment-page-1/

Testing an Dual-band Antenna

With being limited to 101 points on the Nano VNA it can make reading the charts more difficult when sweeping multiple bands. As seen in the image on the right when sweeping 140.000 MHz thru 450.000 MHz.

Testing an Dual-band Antenna

Reducing the sweep span greatly increases the detail of the graphs as seen on the right. This is sweeping 144MHz to 149MHz.
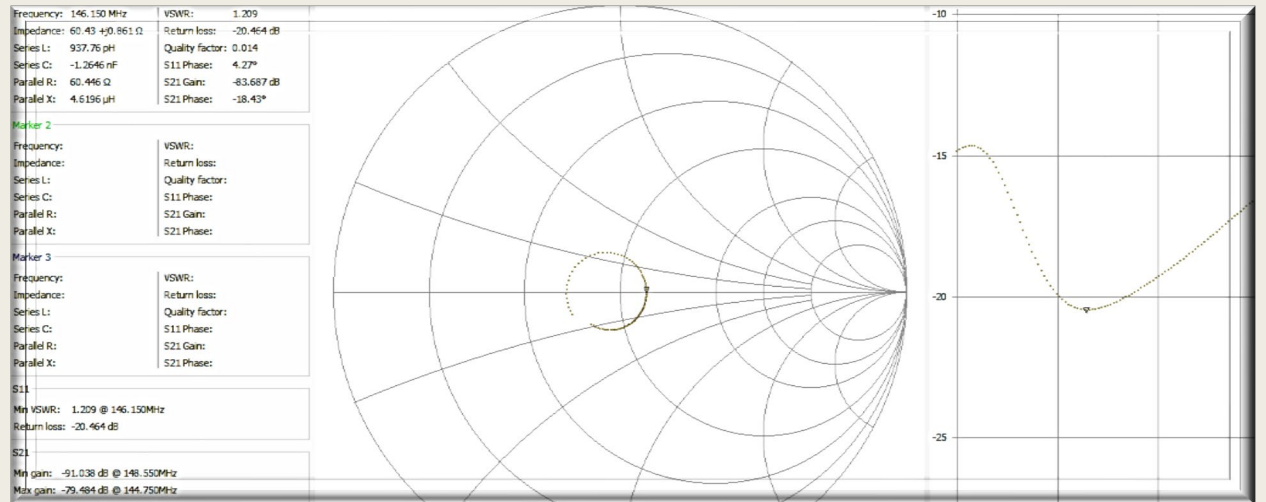
Time-Domain Reflectometer (TDR)

An additional feature that the Nano VNA is capable of is giving the estimated length of the coax cable. This feature is only available when connected to a PC or Tablet and for the most accurate estimation you MUST calibrate the NanoVNA to the frequency being swept.
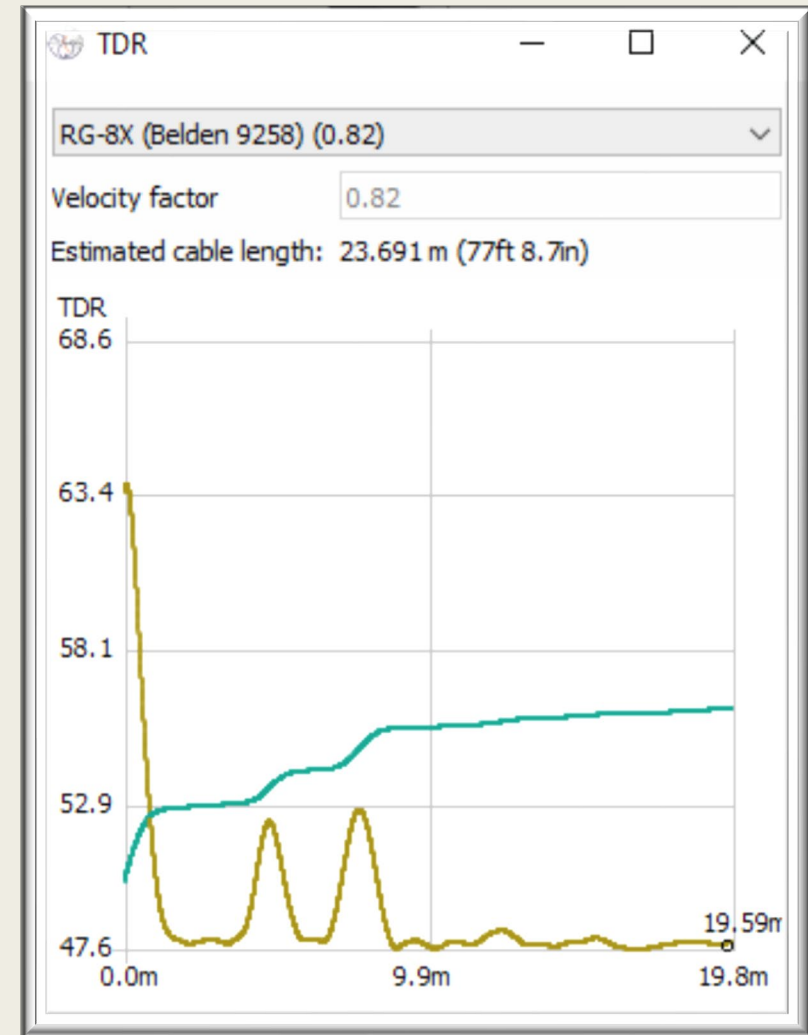
The physical measurement of the coax is 77' 10.5".

Additional Resources:

- Coax loss calculator: www.kv5r.com

- NanoVNA-Saver Download: https://github.com/mihtjel/nanovna-saver/releases

- Linux Platform Help: https://nt7s.com/2019/09/some-pc-software-for-nanovna/

- NanoVNA-Smart Download: https://oristopo.github.io/nVhelp/html/software.htm

- Additional videos and help: https://www.rtl-sdr.com/reviews-of-the-nanovna-an-ultra-low-cost-50-vector-network-analyzer/comment-page-1/

- Forum Group at Groups.io: https://groups.io/g/nanovna-users/topics

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The End

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